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10/618,857	07/15/2003	Taekyun Kim	033808-004	6991
21839 7590 10/05/2007 BUCHANAN, INGERSOLL & ROONEY PC POST OFFICE BOX 1404 ALEXANDRIA, VA 22313-1404			EXAMINER YUAN, KATHLEEN S	
			ART UNIT 2624	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/618,857

Applicant(s)

KIM ET AL.

Examiner

Kathleen S. Yuan

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 9/11/2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 10-17, 19-27, 29-37 is/are rejected.
- 7) ☒ Claim(s) 9, 18, 28, 38 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

The response received on 9/11/2007 has been placed in the file and was considered by the examiner. An action on the merit follows.

Response to Amendment

1. The amendments filed on 11 September 2007 have been fully considered.

Response to these amendments is provided below.

Summary of Arguments/Amendments and Examiner's Response:

2. *The applicant argues that Zhao does not disclose or suggest the "second LDA transforming unit for LDA transforming the single vector into a single face descriptor." Because Zhao generates the global eigenvector using concatenation and not by PCA.*

3. The examiner disagrees. By concatenating eigenvectors, Zhao is using PCA because Zhao is using eigenvectors, which is part of the PCA analysis. The individual units are not expressly disclosed in the reference; however, it was explained it is obvious to have an apparatus in order to carry out the method and that units that carry out functions described are units in each of the steps. Further, it was admitted that Zhao et al does not disclose expressly LDA or GDA. Other references are brought into the rejections in order to teach this.

4. *The applicant argues that Belhumeur (and all other references) do not cure the deficiencies of Zhao.*

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5. Since there are no deficiencies to cure, as explained above, the rejections are maintained.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 27 and 37 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

8. Claims 27 and 37 recite the limitation "the first similar face images" in lines 5-6. There is insufficient antecedent basis for this limitation in the claim.

9. Claims 27 and 37 recite the limitation "the second similar face images" in lines 10-11. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 10, 11, 12, 14, 17, 29, 30, 33, 36 and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over "Mosaic image method: a local and global method"

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(Zhao et al) in view in view of Eigenfaces vs. Fisherfaces: Recognition Using Class Specific Linear Projection (Belhumeur et al).

Regarding claim 29, Zhao et al discloses a method comprising the steps of: dividing an input image (for training) into components by dividing an image into small mosaic images (page 3, paragraph 4); PCA transforming the divided facial components into component descriptors of the components by calculating local eigenvectors for the mosaic images (page 3, paragraph 4); synthesizing the transformed component descriptors into a single vector by calculating a global eigenvector (page 3, paragraph 4 and page 4, eq. 4); PCA transforming the single vector into a single face descriptor when trying to recognize an image by finding the projection vector of a new input image (page 4, paragraph 6); and determining similarities between an input query face image and face images stored in a face image DB by comparing a face descriptor of the input query face image with face descriptors of the face images stored in the face image DB by comparing the new image and the models (page 8, paragraph 2).

Zhao et al does not disclose expressly that the transformation units are LDA, and that the image that is used is a facial image, thus making all the image steps related to a facial image.

Belhumeur et al discloses that it is well known to use PCA and LDA for facial images, disclosing the word "fisherface" for LDA and "eigenface" for PCA (title, page 2, paragraph 2). Belhumeur et al also compares LDA versus PCA, finding LDA is an appropriate method in place of PCA (page 1, paragraph 5-page 2, paragraph 2).

Zhao et al and Belhumeur et al are combinable because they are from the same field of endeavor, i.e. pattern recognition.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use LDA instead of PCA and to use recognition for facial recognition.

The suggestion/motivation for doing so would have been a more robust system by providing an optimal method from a discrimination standpoint (page 2, paragraph 1) which provides less errors in cases with lighting variation, facial expression, and presence of glasses (page 8, paragraph 2).

Therefore, it would have been obvious to combine the recognition method of Zhao et al with the facial LDA recognition of Belhumeur to obtain the invention as specified in claim 29.

12. Regarding claim 30, Zhao et al discloses the step of PCA transforming the divided components comprises the steps of: PCA transforming the divided components into component descriptors of the components, transforming them into local eigenvectors (page 3, paragraph 4); and vector normalizing the transformed component descriptors into a one-dimensional vector by subtracting the mean and getting the 1 dimensional vector shown in eq. 6 (page 4, paragraph 6). Belhumeur et al discloses the images are facial images (title, page 2, paragraph 2), and using LDA instead of PCA (page 1, paragraph 5-page 2, paragraph 2).

13. Regarding claim 33, Zhao et al discloses comparing of the input query face image with the face images of the image DB, or model images that have been previously processed, is performed by comparing the face descriptor of the input query

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face image with the face descriptors of the face images stored in the image DB (page 8, paragraph 2).

14. Regarding claim 36, Zhao et al discloses that the step of determining similarities comprises the steps of: extracting first images, a group of model images that were first processed, and second images, a second group of model images that are processed as more model images are input (page 8, paragraph 2); and determining similarities between the input, a third image that is input as the process continues to input faces, a second set of query images and the face images of the image DB using the similarities between the input query face image and the second similar face images since all the images are compared (page 8, paragraph 2). Belhumeur et al discloses the images are facial images (title, page 2, paragraph 2), so therefore, the first images, second images, and input query face are all similar to each other because the images are all of a face.

15. Regarding claim 37, Zhao et al discloses the step determining similarities comprises: a first similarity determination step of determining similarities between the input query face image and the face images of the image DB, the model images (paragraph 8, page 2); the first similar face image extraction step of extracting the first similar face images in an order of similarities according to results of the first similarity determination step by finding the model image that reaches the smallest distance (page 9, paragraph 3); the second similarity determination step of determining similarities between the first similar face images and the face images of the image DB when repeating the process for a new face image (page 8, page 2); and the second similar face image extraction step of extracting the second similar face images for each of the

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first similar face images in an order of similarities according to results of the second similarity determination step when the repeated process continues (page 8, paragraph 2).

16. Claim 10 is rejected for the same reasons as claim 29. Thus, the arguments analogous to that presented above for claim 29 are equally applicable to claim 10. Claim 10 distinguishes from claim 29 only in that claim 10 is an apparatus claim and claim 29 is a method claim. It is inherent if not obvious that a method must use an apparatus in order to carry out the method. In an apparatus, units that carry out the functions described are the units of each of the steps. Therefore, prior art applies.

17. Claims 11 and 17 are rejected for the same reasons as claims 30 and 36, respectively. Thus, the arguments analogous to that presented above for claims 30 and 36 are equally applicable to claims 11 and 17. Claims 11 and 17 distinguish from claims 30 and 36 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

18. Regarding claim 12, Zhao et al discloses PCA transformation and vector normalization are each provided for the divided components since the full image undergoes transformation and normalization (page 4, paragraph 6). Belhumeur et al discloses the images are facial images (title, page 2, paragraph 2), and using LDA instead of PCA (page 1, paragraph 5-page 2, paragraph 2). In an apparatus, the units that carry out the functions described are the units of each of the steps.

19. Claim 14 is rejected for the same reasons as claim 33. Thus, the arguments analogous to that presented above for claim 33 are equally applicable to claim 14.

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Claim 14 distinguishes from claim 33 only in that they have different dependencies and claim 14 claims that the image databases stores the descriptors of images. Since the dependencies have been previously rejected, and since Zhao et al discloses that previously processed model images are compared to the input, which therefore must be stored (page 8, paragraph 2), prior art applies.

20. Claims 1, 2, 3, 5, 8, 19, 20, 23, 26 and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al as applied to claims 10 and 29 above, and further in view of "Generalized Discriminant Analysis using a Kernel Approach" (Baudat).

Regarding claim 19, Zhao et al (as modified by Belhumeur et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Claim 19 is rejected for the same reasons as claim 29. Thus, the arguments analogous to that presented above for claim 29 are equally applicable to claim 19. Claim 29 distinguishes from claim 19 only in that claim 29 uses GDA instead of LDA.

Zhao et al (as modified by Belhumeur et al) does not disclose expressly using GDA.

Baudat discloses using GDA as a means to carry out LDA (page 1, paragraph 1).

Zhao et al (as modified by Belhumeur et al) and Baudat are combinable because they are from the same field of endeavor, i.e. recognition processes using discriminant analysis.

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At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use GDA instead of LDA.

The suggestion/motivation for doing so would have been to provide a more robust method for non-linear problems.

Therefore, it would have been obvious to combine the method of Zhao et al (as modified by Belhumeur et al) with Baudat to obtain the invention as specified in claim 19.

21. Claim 1 is rejected for the same reasons as claim 19. Thus, the arguments analogous to that presented above for claim 19 are equally applicable to claim 1. Claim 1 distinguishes from claim 19 only in that claim 1 is an apparatus claim and claim 19 is a method claim. It is inherent if not obvious that a method must use an apparatus in order to carry out the method. In an apparatus, units that carry out the functions described are the units of each of the steps. Therefore, prior art applies.

22. Claims 2, 3, 5, 8, 20, 23, 26, and 27 are rejected for the same reasons as claims 11, 12, 14, 17, 30, 33, 36, and 37, respectively. Thus, the arguments analogous to that presented above for claims 11, 12, 14, 17, 30, 33, 36, and 37 are equally applicable to claims 2, 3, 5, 8, 20, 23, 26, and 27. Claims 2, 3, 5, 8, 20, 23, 26, and 27 distinguish from claims 11, 12, 14, 17, 30, 33, 36, and 37 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

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23. Claims 15, 16, 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al, as applied to claims 10 and 29 above, and further in view of "Multiresolution Eigenface-Components" (Kouzani et al).

Regarding claim 15, Zhao et al (as modified by Belhumeur et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Zhao et al (as modified by Belhumeur et al) does not disclose expressly the divided face components are partially overlapped with each other.

Kouzani et al discloses a different way of dividing face images, in different features, which partially overlap each other (fig. 2).

Zhao et al (as modified by Belhumeur et al) and Kouzani et al are combinable because they are from the same field of endeavor, i.e. facial recognition.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to partially overlap the images.

The suggestion/motivation for doing so would have been to provide a more accurate recognition by providing full information for each feature.

Therefore, it would have been obvious to combine the apparatus of Zhao et al (as modified by Belhumeur et al) with the partial overlapping of Kouzani et al to obtain the invention as specified in claim 15.

24. Regarding claim 16, Kouzani et al discloses that the face components into which the input face image is divided comprises eyes, a nose and a mouth (fig. 2).

25. Claims 34 and 35 are rejected for the same reasons as claims 15 and 16, respectively. Thus, the arguments analogous to that presented above for claims 15 and

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16 are equally applicable to claims 34 and 35. Claims 15 and 16 distinguish from claims 34 and 35 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

26. Claims 6, 7, 24 and 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur and Baudat, as applied to claims 1 and 19 above, and further in view of Kouzani et al.

Claims 6, 7, 24 and 25 are rejected for the same reasons as claims 15, 16, 34 and 35, respectively. Thus, the arguments analogous to that presented above for claims 15, 16, 34 and 35 are equally applicable to claims 6, 7, 24 and 25. Claims 15, 16, 34 and 35 distinguish from claims 6, 7, 24 and 25 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

27. Claims 13 and 31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al, and further in view U.S. Patent No. 6567771 (Erdogan et al).

Regarding claim 13, Zhao et al (as modified by Belhumeur et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Zhao et al (as modified by Belhumeur et al) does not disclose expressly a transformation matrix/transformation coefficient DB for storing a transformation matrix or transformation coefficients calculated by training the face images stored in the image

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DB, wherein the first LDA transformation unit or the second LDA transformation unit performs LDA transformation using the stored transformation matrix or transformation coefficients.

Erdogan et al discloses that it is well known that when training a pattern recognition system, during LDA processes, a number of matrices are determined and used to determine a transformation matrix (col. 5, lines 39-47). This must be stored somewhere, in order for use later when the matrix is used to reduce the dimensions of a feature vector (col. 5, lines 47-49). Reducing the feature vector is part of the second LDA process, since it is reducing the feature vector of an input image; thus, the transformation matrix is used in the second LDA process.

Zhao et al (as modified by Belhumeur et al) and Erdogan et al are combinable because they are from the same field of endeavor, i.e. recognition using LDA.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to use the transformation matrix.

The suggestion/motivation for doing so would have been to provide the most accurate LDA recognition by being able to find the relationship between the model images and the input image.

Therefore, it would have been obvious to combine Zhao et al (as modified by Belhumeur et al) with the transformation matrix of Erdogan et al to obtain the invention as specified in claim 13.

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Regarding claim 31, Erdogan et al discloses that the LDA transforming is carried out using a transformation matrix or a transformation coefficient calculated by training the face images stored in the image DB (col. 5, lines 37-49).

28. Claims 4 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al and Baudat, and further in view Erdogan et al.

Claims 4 and 21 are rejected for the same reasons as claims 13 and 31, respectively. Thus, the arguments analogous to that presented above for claims 13 and 31 are equally applicable to claims 4 and 21. Claims 4 and 21 distinguish from claims 13 and 31 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

29. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al, and further in view of U.S. Patent Application Publication No. 20040066953 (Bock).

Zhao et al (as modified by Belhumeur et al) discloses all of the claimed elements as set forth above and incorporated herein by reference.

Zhao et al (as modified by Belhumeur et al) does not disclose expressly the step of outputting the face images of the image DB retrieved based on the determined similarities.

Bock discloses outputting face images of the identified face person (page 1, paragraph 0005).

Zhao et al (as modified by Belhumeur et al) and Bock are combinable because they are from the same field of endeavor, i.e. facial recognition.

At the time of the invention, it would have been obvious to a person of ordinary skill in the art to output the recognized face image.

The suggestion/motivation for doing so would have been to provide a more user-friendly system that would allow the information processed to be viewed by someone who wanted to know the result.

Therefore, it would have been obvious to combine Zhao et al (as modified by Belhumeur et al) with the output of Bock to obtain the invention as specified in claim 32.

30. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao et al in view of Belhumeur et al and Baudat, and further in view of Bock.

Claim 22 is rejected for the same reasons as claim 32. Thus, the arguments analogous to that presented above for claim 32 are equally applicable to claim 22. Claim 22 distinguishes from claim 32 only in that they have different dependencies, both of which have been previously rejected. Therefore, prior art applies.

Allowable Subject Matter

31. Claims 9, 18, 28 and 38 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

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32. Claims 9, 18, 28 and 38 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

33. Claims 9, 18, 28 and 38 are allowable because of the reasoning disclosed in the previous office action.

Conclusion

34. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kathleen S. Yuan whose telephone number is (571)272-2902. The examiner can normally be reached on Monday to Thursdays, 9 AM to 5 PM.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bhavesh Mehta can be reached on (571)272-7453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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